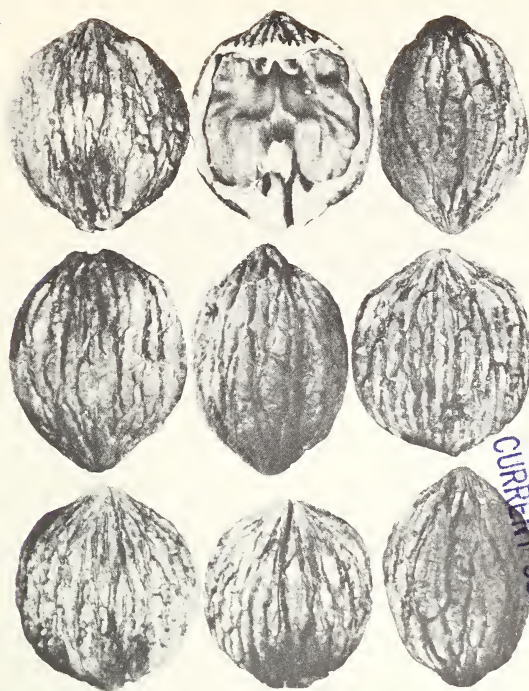


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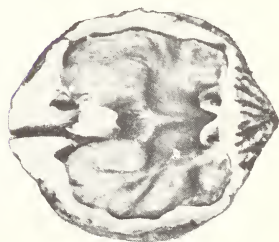
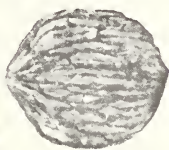
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GROWING BLACK WALNUTS

for home use



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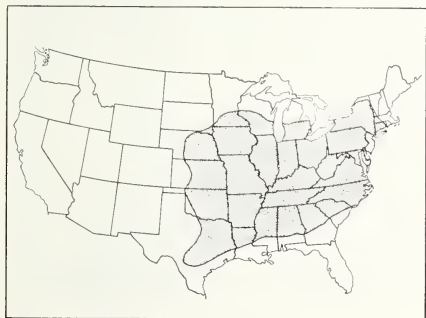
GROWING BLACK WALNUTS for home use

Prepared by Northeastern Region, Agricultural Research Service

The black walnut tree is native to much of the United States east of the Great Plains. It is a desirable shade and ornamental tree, and will produce nut crops on a wide variety of sites and soil types within its natural range. The tree can be grown for shade or ornamental purposes a few hundred miles outside of its natural range, but may not produce nuts there.

To grow black walnuts for home use—

- Plant trees of improved varieties.
- Plant them in early spring on fertile, well-drained soils.
- Provide sufficient moisture and nutrients.



Area in which the black walnut grows as a native tree.

- Control diseases and insect pests.

VARIETIES

Several improved, grafted varieties of black walnut trees are available. They are far superior to native trees grown from seed.

Three of the most widely planted of the improved varieties are Thomas, Ohio, and Myers. They start bearing nuts the second or third year after they are planted, while native trees do not start bearing nuts until about 10 years after being planted.

At 5 or 6 years of age, Thomas and Ohio each produce about one-fourth of a bushel of nuts, and Myers produces about one-eighth of a bushel of nuts. At 15 to 20 years of age, Thomas and Ohio produce about 2 bushels of nuts, Myers produces about 1 bushel of nuts, and native trees produce about one-fourth of a bushel of nuts.

Nuts produced by native trees usually have thick and heavy shells. Thomas and Ohio nuts have thinner shells, and Myers nuts have the thinnest shells of all.



In an "on" year—a year of heavy production—this black walnut tree of the variety Ohio yielded $16\frac{1}{2}$ bushels of nuts. The tree was 30 years old.

Walnut anthracnose is the most serious disease of the native trees. Ohio is resistant to the disease, but in years of severe infection it may be defoliated. Myers usually is more resistant to anthracnose than native trees, but less so than Ohio. Thomas is the least resistant of the three improved varieties.

Improved varieties of black walnut do not come true from seed. They are propagated by grafting scions (twigs) from trees of the desired varieties onto the main stems of 2- or 3-year-old native seedlings. The scions develop into tree crowns that bear nuts of their own varieties.

Little information is available to indicate the best varieties for different localities. Local nurseries usually sell varieties that are best suited to their own localities.

For the greatest possible nut production, plant trees of two or more varieties. Usually, pistillate (female) flowers produce nuts after being pollinated by staminate flowers of the same tree. In very early or very late spring, the pistillate flowers may not be ready when the pollen is shed. Different varieties have overlapping pollen-receptivity periods and can pollinate each other.

All black walnut trees tend to bear heavy nut crops every second year and light ones in between. Exact cultural practices to offset alternate-year bearing have not been developed.

PLANTING SITES

Black walnut trees grow best in rich, loose soils of limestone origin that are at least 4 feet deep. Since the trees develop deep taproots, the subsoil should be easily penetrated by roots.

The soil must be well drained and not strongly acid. The trees will not grow well on bottomland where the soil is often saturated with water. They will not grow well or produce large nut crops on eroded hillsides or other land that will not support good corn crops. Reliable indicators

of suitable land are good stands of white oak and tulip-poplar.

PLANTING TIMES

The most favorable time to plant black walnut trees in most areas is in early spring. New roots will then be able to grow quickly to replace those lost in transplanting.

In the South, you can plant young trees in the fall or winter. Trees planted north of the Ohio and Potomac Rivers in fall and winter will not grow new roots before the ground freezes and may die.

SPACING

Black walnut trees planted for either ornamental use or nut production should be spaced at least 60 feet apart. Branches and roots will then have enough space in which to spread out.

SETTING TREES

For trees up to 7 feet tall, dig a hole 2 feet deep and 3 feet wide. Place the tree at the same depth in the hole as it stood in the nursery bed and spread the roots out well. Refill the hole with topsoil. Tamp the soil down around the roots until the ground is firm. Then form a basin around the edge of the hole with extra soil and soak the soil immediately.

FERTILIZER AND LIME REQUIREMENTS

Fertilizing

Black walnut trees need large amounts of nitrogen and potassium for best growth and nut produc-



Flowers of black walnut: S, Staminate (male) flowers; P, pistillate (female) flowers.

tion. They need small amounts of phosphorus.

Apply mixed fertilizers each year. Spread them evenly under the tree branches when the buds begin to swell in early spring.

Mixed fertilizers having analyses of 5-10-5 and 10-10-10 give good results. One good rule is to apply 1 pound of 5-10-5 fertilizer, or one-half pound of 10-10-10 fertilizer for each year of tree age. Do not use any during the first spring, however, because of the danger of injuring roots.

To fertilize trees in yards, apply a little more under the branches than you would normally use on your lawn.

Some trees are grown near barns or in stock or poultry yards to provide shade. They benefit from the natural addition of manures and usually flourish.

Liming

In strongly acid soils, important nutrients are often unavailable to black walnut trees. If your soil is strongly acid, apply enough lime to change the pH to 6 or 6.5. Do not overlime; overliming makes zinc in the soil unavailable to the tree.

Soils east of the Mississippi River are sometimes deficient in magnesium. Crushed dolomitic limestone—which contains magnesium oxide—will correct this and reduce the acidity of your soil.

Your county agricultural agent can test the soil for its acidity and arrange for an analysis of its nutrient needs. You may also send a soil sample to your State agri-

cultural experiment station for analysis.

OTHER REQUIREMENTS

Black walnut trees often need to be watered or otherwise cared for to grow well and produce large nut crops.

Because of their deep tap roots, the trees can tolerate periods of dry weather. Keep an area 4 feet in diameter around each tree cleared of weeds and grasses that would compete for water and nutrients. Herbicides which may be used for this purpose include:

Simazine [2-chloro-4,6-bis (ethylamino)-s-triazine].

Trifluralin [*a,a*-triflouro-2,6-dinitro-*N,N*-dipropyl-*p*-toluidine].

Paraquat [1,1'-dimethyl-4,4'-bipyridinium (cation)].

Simazine should be applied in the spring to a weed-free surface. It will then control most weeds during the remainder of the growing season. It should not be applied to young trees during the first year after planting.

Trifluralin may be applied before planting young trees or in the spring to established trees. In both cases, trifluralin should be worked into the top 2 inches of soil.

Paraquat kills most emerged annual weeds. It has no residual activity.

Each of these herbicides will control many germinating annual broadleaf weeds and weed grasses. Simazine also controls perennial weeds such as quackgrass and Canada thistle. Paraquat applied to foliage kills the tops of annual and perennial weeds.

Hand weeding and mulches should be used instead of herbicides around the home where herbicide-sensitive plants are grown. Mulches may be used to supplement herbicides in establishing young walnut trees.

The part of your tree that is below the graft may produce suckers. Prune these off at the trunk. Unless removed while small, the suckers may crowd out the shoot growing from the variety scion.

Livestock should not be allowed to graze around young black walnut trees. When the trees are 15 years old, however, they can be interseeded with grasses and legumes. Animals turned in to pasture will not damage these older trees.

HARVESTING NUTS

Lightly colored walnut kernels have a milder flavor than dark ones. If you prefer light kernels, harvest the nuts as soon as they drop from the trees in the fall. Leaving them on the ground until the hulls partially decompose causes a discoloration of the kernels.

The hulls are thick and fleshy at maturity. They can be mashed and removed by hand, but mechanical devices make the job easier. Vegetable peelers used in restaurants and hand- and power-operated corn shellers will remove the hulls satisfactorily.

The rear wheel of an automobile can be an effective hull remover. Fit one of the rear wheels with a tire chain and jack up the rear with just enough room beneath the tire for the nuts to pass. The chain will remove the hulls as the nuts are forced

through the trough formed by the turning wheel.

After the hulls are off, the nuts should be washed thoroughly and spread out away from direct sunlight to dry. Drying will take 2 or 3 weeks. The nuts can then be stored in a cool, dry place until needed.

It is difficult to extract kernels in large pieces from most varieties of black walnut because of the thick shell and convolutions of the kernel. The nuts can be tempered by soaking them in water for 1 or 2 hours, then keeping them moist overnight in a closed container. The kernels absorb enough moisture to become tough, yet remain loose in the shell.

DISEASES

The most serious diseases of black walnut are walnut anthracnose and bunch disease. They attack the tree throughout its natural range.

Walnut Anthracnose

Symptoms and damage.—Walnut anthracnose, or leaf blotch, is a fungus disease that destroys leaves of black walnut trees. It overwinters in fallen leaves, and the first infection by the spores on new leaflets occurs from the middle of May until the middle of June.

Infected leaflets develop many circular, dark-brown spots, ranging from one-sixteenth to five-sixteenths of an inch in diameter. These often merge to form large dead areas with yellow borders. Infected leaflets usually drop from trees by late July or early August.

In years of severe infection, black walnut trees are often entirely de-



Black walnut tree early September, severely defoliated by the anthracnose fungus disease. Many of the nuts fell prematurely; kernels in the remaining nuts were poorly filled.

foliated. Many of the nuts are then empty or contain blackened and shriveled kernels. Badly infected trees grow little, and are greatly weakened and more vulnerable to winter injury.

Control.—The disease can be controlled by four applications of a fungicide spray each year. Start the treatment when the walnut leaves unfold, and apply at 2-week intervals. Do not wait for spots to appear before spraying or serious damage will have been done. Trees ranging from 15 to 25 feet tall will need 5 to 10 gallons of spray apiece in each application. Commercial spraying services may be required to properly spray trees of this height.

Dodine or low-lime bordeaux sprays are suggested for control of anthracnose. Use dodine at one-half ounce of active ingredient (one-half tablespoon) to 5 gallons of water.

Do not use more than 6.5 pounds per acre. Do not apply after hulls begin to split. For low-lime bordeaux, mix 1 cup of lime and $1\frac{1}{3}$ cups of ground copper sulfate with 10 gallons of water.

Bunch Disease

Symptoms and Damage.—Bunch disease stunts the growth of black walnut trees and lowers nut production. The cause of the disease and means of spread and infection are unknown.

Infected trees develop bushy, broomlike shoots on branches in midsummer, and also upright, suckerlike shoots on trunks and main branches. Some shoots die back during late summer, but others are killed during the winter. In addition, leaflets narrow, curl, and turn yellow.



Broomlike growth on the trunk and main branches is characteristic of bunch disease of black walnut.

Control.—There is no control for bunch disease. It is recommended that all diseased trees be removed and destroyed.

INSECT PESTS

The most serious insect pests of black walnut trees are the walnut lace bug, curculios, walnut husk maggot, walnut caterpillar, and fall webworm. These pests and measures to control them are outlined below.

Walnut Lace Bug

Description.—The walnut lace bug is a very small, fragile, flylike insect with lacy wings. It appears in early summer. Two or three generations may be hatched within a season.

Damage.—Lace bugs destroy the food-producing capability of leaves by inserting their mouthparts in the undersides of leaflets and sucking out juices. These leaves turn gray and yellow, and some drop prematurely. The nuts are poorly filled and the tree itself is weakened.

Curculios

Description.—Two species of curculios commonly attack walnut trees. The adults of both species are one-fourth of an inch long, have long curved snouts, and have prominent humps and ridges on their wing covers.

Damage.—Beginning in June, the adults feed on newly formed nuts and also on new foliage. The females lay their eggs in crescent-shaped punctures in the nuts. These nuts drop before maturing.



The walnut lace bug. (About 8 times natural size.)

Walnut Husk Maggot

Description.—The walnut husk maggot hatches from eggs laid in the hulls of maturing walnuts. The adult fly is the same size as a house fly, is pale yellow with brown eyes, and has transparent wings with dark stripes. The flies appear in early July in the South and in late July in the North. They are in the trees for several weeks before starting to lay eggs. The larvae are whitish maggots that are up to one-half inch long.

Damage.—The maggots feed in the husks (hulls) of maturing walnuts. The quality of the kernels of these nuts is reduced, and fragments of the hulls cling tenaciously to the shells even after cleaning.

Walnut Caterpillar

Description.—The walnut caterpillar is the larva of a large brown moth that has a 2-inch wingspan.

The full-sized caterpillar is 2 inches long, black, and has white hairs. It distinctively raises both ends of the body when disturbed. In the North, there is a single generation in late summer. In the South, there may be two generations, one in early July and the other in early September.

Damage.—The caterpillars can entirely defoliate black walnut trees. After hatching from masses of 200 to 300 eggs laid on the undersides of leaflets, they feed in groups on the leaves.

Fall Webworm

Description.—The fall webworm adult is a white moth that sometimes has brown or black spots on the wings. The worm reaches 1 inch in length, has black and orange spots, and is hairy. Its presence is indicated by distinctive gray webs that enclose branch tips and leaves. There may be early summer and fall generations.

Damage.—The webworms can defoliate black walnut trees. They feed in groups on leaves inside the webs, enlarging the webs as they need more leaves.

Control of Walnut Insects

Cultural control

Removing diseased leaves and nuts from the ground underneath the trees often reduces or eliminates insect infestations. Weed control also reduces insect habitats and often eliminates host plants.

Mechanical control

When only one or two small trees are infected, hand picking cater-

pillars and pruning and destroying webworm nests will give control. When more than one or two trees are infected, mechanical removal of caterpillars and webworm nests can help control these insects. Curculio damage can be reduced by collecting all prematurely dropped nuts and burning them immediately to destroy the developing larvae.

Chemical control

Malathion effectively controls many insect pests of walnut trees, including walnut lace bugs, walnut husk maggots, and fall webworms. To prepare the spray, mix $1\frac{1}{2}$ tablespoons of malathion (active ingredient) with 10 gallons of water. Trees 15 to 25 feet tall will require 5 to 10 gallons of spray each.

Walnut lace bugs.—Spray the foliage when the nuts are pea to marble size. If later generations appear, repeat the spray application.

Walnut husk maggots.—Spray the foliage when the first flies appear. Three weeks later a second application may be needed.

Fall webworms.—Spray the foliage when the first webworms appear.

Walnut caterpillars can be controlled with a spray containing diazinon. Mix 16 tablespoons (1 cup) of active ingredient with 10 gallons of water. (Do not apply after the husks are open.)

Methoxychlor, carbaryl, and some other insecticides are also registered for use on black walnuts. If you plan to use these insecticides, read the container label to learn what pests they may be used to control.

In some localities, serious damage

may also be caused by other leaf-feeding caterpillars, scales, aphids, and twig girdlers. If malathion or diazinon does not control these insects, ask your county agricultural agent or State agricultural experiment station for specific information.

PRECAUTIONS

Pesticides used improperly can be injurious to man, domestic animals, beneficial insects, plants, fish, and wildlife. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers—out of reach of children and pets—and away from foodstuff.

Apply pesticides selectively and carefully. Do not apply a pesticide when there is danger of drift to other areas. Avoid prolonged inhalation of a pesticide spray or dust. When applying a pesticide it is advisable that you be fully clothed.

After handling a pesticide, do not eat, drink, or smoke until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Dispose of empty pesticide containers by wrapping them in several layers of newspaper and placing them in your trash can.

It is difficult to remove all traces of a herbicide (weed killer) from equipment. Therefore, to prevent injury to desirable plants do not use the same equipment for insecticides and fungicides that you use for a herbicide.

NOTE: Registrations of pesticides are under constant review by the U.S. Environmental Protection Agency. Use only pesticides that bear a Federal registration number and carry directions for home and garden use.



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U.S. DEPARTMENT OF AGRICULTURE

Washington, D.C.

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